

Applied Informatics Research Group

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ANNUAL REPORT 2013



THE UNIVERSITY OF
NEWCASTLE
AUSTRALIA

Applied Informatics Research (AIR) Group

ANNUAL REPORT 2013



EXECUTIVE SUMMARY

The Applied Informatics Research (AIR) Group brings together researchers from within the School of Design, Communication and IT with collaborators from across the University of Newcastle and external institutions. Together, the members of the group seek to provide a collaborative environment to support and further the diverse research interests of the group under the umbrella of applied informatics.

During 2013, the efforts of the individual members of the group resulted in the following key achievements:

- During 2013, AIR group members were attributed with 5 book chapters, 47 journal articles and 36 refereed conference publications.
- Researchers within the AIR group acted as Chief Investigators on projects involving \$403,802 in research funding
- The AIR Group Working Paper Series was launched as part of a strategy to increase the visibility, and therefore citation counts, to members' research outputs. Five articles in the series were published the University's Digital Repository, NOVA, between August to December 2013.
- The group were selected to host the 10th Australasian Conference on Interactive Entertainment (IE2014) in December 2014. This initiative will provide significant opportunities for developing collaborations, particularly with industry, as well as engaging RHD students.
- Two key industry collaborations were initiated during 2013 with HunterNet and the Australian Tax Office.
- Two dedicated research spaces were introduced in the ICT building to promote and support innovative interactive research.

In 2014, key aims for the AIR Group include:

- Increasing the overall research outcomes for the Group. Activities to achieve this aim will focus on developing collaborations with similar, internationally based groups and the hosting of the IE2014 conference.
- Improving, and developing pathways for, RHD student enrolment. This will involve developing and capitalising on relationships with Hunter industries with a view to attracting RHD student funding.
- Conducting an analysis of industry based data resources in the Hunter to identify potential areas for research and collaboration.
- Building relationships with business to share expertise with the business community. This will include holding seminar(s)/workshop(s) for information sharing with industry groups such as HunterNet.

INTRODUCTION

Informatics is the study of Information Technology and its uses. Applied Informatics emphasises its application to real world problems. The research undertaken by members of the Applied Informatics Research (AIR) Group focuses on assisting industry and organisations to understand, and ultimately leverage, the data that they capture and store. This assistance is provided by conducting research that results in the identification and communication of useful patterns and the design of improved processes (Figure 1).

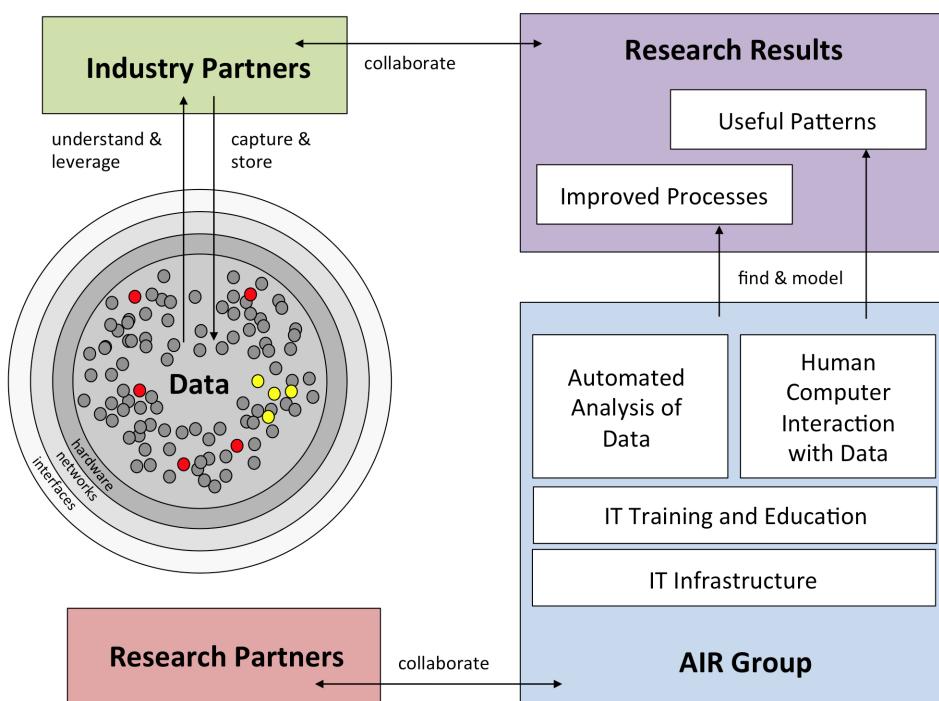


Figure 1 - AIR Group Activities

During 2013, the AIR Group held regular monthly meetings (12), with an additional two extraordinary meetings held for strategic planning activities. Each meeting was attended by an average of 10 AIR group members. At the end of 2013, the AIR group had a total of 25 members. This was an increase in membership of four from 2012.

The broad strategic aims for the AIR group are:

1. To grow expertise in all areas of Applied Informatics
2. To build relationships with business to share expertise with the business community.
3. To establish multi disciplinary research collaborations with other researchers across the University of Newcastle.
4. To engage with international research partners relevant to the strategic direction of the group.
5. To communicate outcomes to industry and academics
6. To attract high quality students into research higher degrees compatible with the research directions of the group.
7. To secure and retain sufficient funding to allow these activities to grow.



ACHIEVEMENTS 2013

The activities of the AIR Group fall into three categories:

1. Research – improving the quality of research outputs and attracting funding
2. Industry – providing innovative solutions to address the needs of industry
3. Students – attracting and mentoring high-quality research students

Research Outcomes

Publications – In total, AIR Group members were attributed with 87 publications that include 5 book chapters, 47 journal articles and 36 refereed conference publications. These publications span a range of disciplines and reflect the broad expertise of the group.

Grants – AIR Group members were involved in research projects that attracted \$403,802 in grant funding. This included a role in the City Evolutions project, a landmark contemporary art project featuring a series of interactive digital projections along Newcastle's oldest street, Watt Street. Two HRMI Awards, each to the value of \$25,000, were awarded to projects involving AIR Group members. Additionally, \$14,937 was received through the Australian Council of Deans of ICT to examine the experience of first-year students in ICT courses to assist in the development of good teaching practices.

Conference – The AIR Group has been selected to run the 2014 Interactive Entertainment Conference, with the theme of "Fun and Games". Interactive Entertainment is Australasia's longest running games and digital entertainment conference. This cross discipline conference will be hosted at the University of Newcastle. As part of this conference, students across all disciplines will be invited to help organise, contribute and attend the conference.

Seminars – In 2013 the AIR group organised a seminar series on topics of interest. Highlights were:

- *Human-Centred Visualization* presented by Dr Masahiro Takatsuka of The University of Sydney,
- *Revolution, and Excellence, Agility, Convergence and Collaboration in the Creative Industries*, presented by Terrence Masson, USA,
- *The Use of Immersive Virtual Reality for Training in the Coal Industry* by Bruce Dowsett and Matt Farrelly from Virtual Reality Technologies, Coal Services
- *Artificial Intelligence and Data Mining in Energy Networks* by Adam Berry from Energy Networks, CSIRO.



Figure 2 Bruce Dowsett and Matt Farrelly present a well attended seminar on the use of VR for training in the coal industry



Working Paper Series – The AIR Group established a working paper series in July 2013. Five papers were published to the series between July 2013 and December 2013, which are hosted in the University of Newcastle's digital repository, NOVA. The principal aim of the AIR Group's Working Paper Series is to disseminate the research and/or technical output of the group in an easily accessible format, an approach that has been suggested leads to improved citation rates for authors. The content of Working Papers generally falls into one of the following categories:

- Preliminary findings or results, the release of which is intended to stimulate debate and/or discussion to assist in the further development of the research
- Technical reports associated with applied research that may be written in a less academic style than usually published in academic journals
- Extended versions of published works, often containing additional implementation/application detail, figures and tables.

Industry Collaboration



Microsoft – 2013 saw the development of collaboration with Microsoft to support teaching of TouchDevelop, their integrated development environment for mobile Apps. The IT discipline received approximately 150 smart phones from Microsoft in time to support teaching of mobile App development. This represents an in-kind contribution to the University of approximately \$30,000. This project led to a publication “Teaching Mobile Apps for Windows Devices Using TouchDevelop”, which was delivered at the 16th Australasian Computing Education Conference (ACE 2014), Auckland, New Zealand, January 2014.



HunterNet – During 2013 there was a growing momentum in the relationship between the AIR Group and HunterNet, a group that represents local businesses. Several meetings led to an agreement for the two groups to jointly organise a panel discussion event early in 2014, and to collaborate in a survey of the IT and data analytics needs of HunterNet members.

Australian Tax Office – AIR joined with Jeff Julian and Research Services in meeting with the Newcastle Branch of the Australian Tax Office about possibilities for research collaborations. A MOU is being progressed by Research Services and the AIR Group wishes to develop this relationship in 2014 with a view to initiating a research project.



Coal Services – Virtual Reality Technologies (VRT) and the AIR Group commenced an initial collaboration in 2013. VRT is part of Coal Services and provides advanced training in mine safety and operations using state of the art simulation technology. The initial collaboration involved a student, under the supervision of Keith Nesbitt, working on a Summer Scholarship (7 Jan 2013 – 22 Feb 2013) with staff at Virtual Reality Technologies. Bruce Dowsett, the manager of Virtual Reality Technologies, gave a seminar at the University in May, 2013. A grant has recently been lodged with Coal Services to work in the area of cybersickness within Virtual Reality.



UoN Slingshot Program – Ilung Pranata and Rukshan Athauda were selected to participate in the UoN Slingshot program. In collaboration with Newcastle Innovation and Slingshot, they aim to commercialise research work on rating systems and apply it in industry.

RHD Student Engagement

RHD Students – In 2013, the following students commenced studies: Nada Alharbie, Samar Alqhtani, Xin Gu, Andrew Harvey, Patrick Ng, Thomas Sharp. 2013 also saw the successful completion of the following students: Ilung Pranata, Yu Peng.

RHD Student Meetings – The AIR group, via the discipline, held and supported the first IT RHD student meeting in November 2013. At this meeting, the students identified the need for regular structured meetings to provide a forum to discuss issues, highlight achievements and to gain presentation skills. The AIR group will continue to support these regular meetings in addition to inviting IT RHD students to attend all AIR Group meetings.

Industry-Based PhD Opportunities – Preliminary discussions with the Australian Tax Office (ATO) included consideration of initiatives for part time PhD opportunities to allow ATO sponsored staff to obtain higher degrees. This opportunity will be the focus of future discussions.

STRATEGIC PLAN FOR 2014

The broad aims for the AIR group include:

- To grow expertise in all areas of Applied Informatics
- To engage with international research partners relevant to the strategic direction of the group.
- To establish multi disciplinary research collaborations with other researchers across the University of Newcastle.
- To secure and retain sufficient funding to allow these activities to continue and grow.

The AIR group has identified specific areas of focus, and associated activities to achieve these, for 2014.

Research 2014 Aim

Increase the research outcomes for the Group. Activities to achieve this aim include:

- develop collaboration(s) with similar, internationally based groups at well ranked universities with the end goal of increasing the number of internationally co-authored publications produced by the Group
- host the IE2014 conference
- pursue funding for RHDs, and particularly industry linked RHDs



- improving, and developing, pathways for RHD student enrolment. This will involve developing and capitalising on relationships with Hunter industries with a view to attracting RHD student funding.
- work closely with coursework programs to create pathways to RHD
- continue to produce the Working Paper Series to improve citation rates for Group members
- ensure accurate recording of data for individual group members within University systems

Industry Collaboration 2014 Aim

Improve industry collaboration and develop Industry funded opportunities. Activities to achieve this aim include:

- Initiate a regionally based AIR Group project with a preliminary title of:

How to identify, exploit and interpret the large pools of data held within organisations within the Hunter region?

Initial activities will involve identifying all key organisations in the Hunter region with a view to forging relationships and the of intention of establishing MOUs to enable data sharing

- Hold seminar(s)/workshop(s) for information sharing with industry groups such as HunterNet
- Actively pursue industry collaboration and funding opportunities to support AIR group member research and to attract future RHD students

RHD Student Engagement 2014 Aim

Create a supportive and productive environment for RHD students. Activities to achieve this aim include:

- Providing support to the newly established IT RHD student meeting series
- Maintain and improve attendance at AIR group meetings by RHD students
- Encourage and support RHD student academic career development by offering opportunities to participate in School teaching and research activities. In 2014, this will focus on involving IT RHD students in the organisation of the IE2014 conference, and also their participation through the submission of papers.



APPENDIX A – PEOPLE**Dr Rukshan Athauda**

Database Systems
IT Security
Cloud Computing
ICT Education

**Dr Karen Blackmore**

Agent based models of complex adaptive systems
Data mining and pattern recognition
Global climate models
Spatial and aspatial models of social and physical systems

**Dr Piers Campbell**

Prediction of Wind Spectra
Knowledge Discovery in Industrial Data Sets
Fault Identification in Telecommunication Networks
Alarm Correlation
Development and Performance of Software Product Lines
E-Learning/Cloud based learning
Privacy and modelling in Social Networks

**Bruce Cheek**

Information systems development methodology
Decision support systems
Executive information systems
Electronic commerce (e-commerce)
Strategic information systems and data warehousing

**A/Prof Stephan Chalup**

Autonomous Robots
Computational Intelligence
Data Mining
Dimensionality Reduction and Kernel Methods
Machine Learning
Medical Image Analysis
Neural Information Processing
Vision and Image Processing





Dr Raymond Chiong
Complexity Theory
Artificial life and cellular automata
Evolutionary Computation
Optimisation
Machine learning and data mining



Dr William Chivers
Computer-based modeling
Ecological modeling
Individual-based modeling
Natural resource modeling
Population dynamics
Predator-prey modelling



Dr Joyce Cooper
Serotonin toxicity
Clinical pharmacy
Population PK-PD modelling
Simulation
Teaching & learning
Toxicology



Dr David Cornforth
Applied Machine Intelligence
Data Mining
Electrical Networks
Evolutionary Computation
Health informatics
Multi agent systems
Optimisation
Pattern recognition



Ami Eidels
Cognitive Modeling
Cognitive Psychology
Cognitive Science
Psychology



Dr Herbert Jelinek
Nonlinear analysis of 2D images and biosignals
Diabetes complications screening
Automated diabetic retinopathy screening
ECG analysis
Image analysis tools
Engineering solutions in cardiac and stroke rehabilitation
Rural and remote diabetes complications screening





Dr Suhuai Luo
computer vision
image processing
internet-oriented IT applications
multimedia



Dr Alexandre Mendes
Optimisation
Data Mining
Operations Research
Bioinformatics



Dr Keith Nesbitt
Computer Games
Information Visualisation
Multi-sensory User Interfaces
Virtual Environments
Human Perception and Cognition
Intelligent Agents
Complex Systems
Conceptual Modelling
Creativity and Patterns



Cathie Payne
Archaeology and climate science
Cross-media practices
Digital media and digital cinema histories
Documentary and documentary hybrids
Film, Television and Digital Media
Museum and cultural heritage
Philosophies of cinema
Philosophies of science
Screenwriting and composing practices



Dr Ilung Pranata
Network Security
Trust
Reputation System
Software Engineering



A/Prof Rohan Rasiah
Clinical Pharmacokinetics
Rural and Remote Health
Pharmaceutical Care delivery into rural and remote Australia
Delivery of Primary Health Care by health professionals, including Ambulance officers, Nurses, Pharmacists and allied health staff



Dr Brian Regan
Health Informatics
Privacy Protection
System Development Methodologies



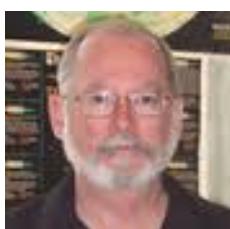
Simon
Academic integrity
Bibliometrics
Computing education



Dr Geoff Skinner
Collaborative Environments
Data Security
Information Privacy



Dr Shamus Smith
Advanced Interfaces
Game Technology
Haptic Interaction
Multi-touch Surfaces
Virtual Reality



Dr Peter Summons
Decision Support
Health Informatics
Information Systems



APPENDIX B – RESEARCH OUTPUT

Book Chapters (5)

Jelinek, H.F., Milošević, N.T., Karperien, A. and Krstonošić, B. (2013) Box-Counting and Multifractal Analysis in Neuronal and Glial Classification. Advances in Intelligent Systems and Computing, Ed. Dumitache, L. Springer Verlag, Vol. 187, pp 177-189. (DOI: 10.1007/978-3-642-32548-9_13; ISBN: 978-3-642-32547-2)

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Grants/Awards

Granting Body	Description	AIR Group Recipient	Amount
Newcastle City Council	City Evolutions in Watt Street	Keith Nesbitt	\$262,430
HRMI Award	Combining startle reflex modulation with serious gaming technologies to determine engagement and impact on depression and binge drinking in young people: The SHADoW Study	Keith Nesbitt	\$25,000
Teaching & Learning Project Grant 2013	Utilisation of modern technology to enhance teaching of communication skills in Master of Pharmacy program.	Keith Nesbitt	\$10,000
Faculty of Science & IT SIRF Grant	Intelligent Transportation Planning: Benchmarking of Novel Business Analytics Techniques using the Travelling Salesman Problem as a Test-Bed.	Raymond Chiong David Cornforth	\$10,000
Microsoft Teaching Support	Donation of 150 smart phones to support teaching.	David Cornforth Bruce Cheek Simon	\$30,000 (in kind)
Josef Stefan Institute, Ljubljana, Slovenia	Travel Grant	David Cornforth	\$2,250
HMRI	Evaluation of a multi-component intervention to reduce screen-time in adolescents: The *Stand Up for Healthy Minds* study	Geoff Skinner	\$25,000
CTL Teaching and Learning Grant	Pilot study on Virtual Cloud Environments for deliver of Adaptive Pre-Course Content Related to Knowledge Modules	Geoff Skinner	\$7,600
Australian Council of Deans of ICT	Experiences of first-year students in ICT	Simon	\$14,937



	courses: good teaching practices		
UON Equity Research Fellowship	Cinematic Topologies: Mapping shifts in nature, thought and mind PHD Research Project with Creative work (documentary) and Exegesis (30,000words)	Cathy Payne	\$7,500
UON New Staff Grant	Spatial Data Analytics: Addressing critical application problems concerning the environment and human society, and the interactions between them, using spatial data analytic approaches	Karen Blackmore	\$4,085
UON New Staff Grant	"Stigmergy, mobility and the evolution of cooperation".	Raymond Chiong	\$5,000



